REPORTING RESEARCH IN EDUCATION

STEPHEN WISEMAN

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by

STEPHEN WISEMAN

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PREFACE

THIS publication deals with the preparation of (*a*) theses on experimental education, and (*b*) reports on research work intended for publication. There are differences in the methods which should be adopted for these two aims. The first part (thesis preparation) is an adaptation of a memorandum which has been issued to M.Ed. students in the Department of Education, University of Manchester, and incorporates changes which have been made over the past year or two as a result of comment and suggestion by students and members of staff. Grateful acknowledgement is made here to these many collaborators, and in particular to Professor R. A. C. Oliver and Mr. T. H. B. Hollins, who have suggested many amendments.

I

THE PREPARATION OF A THESIS ON EXPERIMENTAL EDUCATION

1. A survey of theses submitted for higher degrees in education shows that many writers fail to present their material in the most effective way. In addition to such faults as wordiness, ambiguity and inefficient presentation of data there is often a lack of appreciation of the accepted standards of precision in such matters as the treatment of quotations and the citation of books and articles. This pamphlet has been written in order to give students some elementary advice on the general preparation of a thesis.

2. It must be stated at once that no amount of care in the writing of a thesis can compensate for weaknesses and deficiencies in the experimental work or its design. All that the student can achieve by a study of this memorandum is to ensure that he makes the best of his material by a clear presentation of it, conforming to accepted standards. Although many students may believe that the major aim behind careful preparation is the award of a degree, it must not be forgotten that report-writing is *part of* the research programme, the final stage of which is the effective communication of the methods and results of the research to those competent to make use of them. Good experimental work and significant results are wasted if they are presented in such a way that the methods appear obscure or are inadequately documented, and the significance of the results is submerged in unjustified generalizations. The major aim of research by individual students must always be that of clearing the ground for future workers : this can only be accomplished by spending much time and effort on the technical task of preparing the report of the research.

LENGTH AND FORM OF THESIS

3. It is necessary to clear up a fairly general misunderstanding. To many students a thesis seems to mean a 'long essay', demanding a long-winded dissertation followed by a few pages of tables and results, and concluded by twenty or thirty pages of 'high-level' discussion having the general flavour of a government white paper. It cannot be too strongly emphasized that there is little relation between 'quality' and 'quantity'—indeed, a study of some theses would suggest that what relationship there is may well be an inverse one. It is quite possible to conceive of a highly effective thesis (on an experimental topic) no more than thirty typewritten foolscap pages in length. Most, of course, will be (justifiably) longer than this, but it will be rare indeed to find a 'good' thesis an inch or two inches in thickness.

4. It is much more difficult to write an adequate short thesis than a verbose one. A short thesis demands clear and concise writing, and the pruning of irrelevancies. This can only be achieved by careful writing and re-writing. The writer should note that the aim is not the shortness of the finished product, but its effectiveness: if he writes for clarity and the exact expression of meaning the length will take care of itself. No more precise advice can be given on 'length', except the recommendation that if the thesis appears to be stretching during its writing, the student should suspect that he is being prolix and that pruning is desirable (Gowers, 1948; Royal Society, 1950).* Exactness of meaning is, of course, fundamental quite apart from its relationship to the length of the thesis. Many students fail to realize how much damage can be done to a research report by slipshod writing. A few of the ways in which this occurs are given below, although this list is far from comprehensive.

4.1. Accepting uncritically the products of habits of thought and habits of writing. This produces a series of faults, ranging from the use of the cliché to the use of phrases which betray a belief that the obviousness of a conviction is a guarantee of its truth.

4.2. Omitting to include full details of procedure, or all relevant steps in an argument, on the assumption that what is taken for granted (however vaguely) by the writer will also be taken for granted by the reader.

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* References in brackets are to books and articles listed in the Bibliography on page 21.

4.3. The use of vague ideas or vague phraseology without precise definition. For example, the use of such terms as 'complex', or phrases such as 'At its highest the concept denotes a working through culturally imposed obstacles which had falsified the person towards an autonomy strongly differentiated from group or collective norm pressures.' Such a product betrays a lack of clarity in the mind of the writer.

4.4. The use of technical jargon to an unnecessary degree. Like the last point, this too may try to cover the woolly-mindedness of the writer. For example, 'We have to consider as pathological any non-participation of single organs or organ-groups in the unity and totality of the vegetative function of tension and charge, if it is chronic and represents a lasting disturbance of the total functioning of the organism.'

4.5. The use of clear-cut definitions of facts or phenomena which are *not* clear-cut, i.e. an unwarranted avoidance of complications (which may or may not be perceived by the student). For example, the definition of 'types' produced by coarse grading from a *continuous* distribution, such as 'practically-minded children' and 'academically-minded children', or 'activity schools' and 'formal schools'.

4.6. The use of emotionally-toned words in discussing factual matters (Ogden and Richards, 1944; Thouless, 1930).

4.7. Prejudice, rationalization and illogicality * (Jepson, 1936; Thouless, 1930).

It is generally advisable to begin drafting the thesis before the experimental work is completed. By doing so the writer often becomes aware of the necessity for additional data, or alternative forms of analysis, at an earlier stage than he otherwise would. If this awareness comes at a later date it is often found impossible to correct deficiencies, since opportunities for testing, etc., may have been lost, or the subjects may have been dispersed. In any case, the preparation of the introductory sections of the thesis, calling for precise statements of problems and methods, is a valuable test of the clarity of the experimenter's aims and intentions. Precision in these is an essential preliminary to effective research.

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* The obvious errors in English usage—in spelling and syntax for example—are not considered here (see Fowler, 1926, and Fowler and Fowler, 1931), but the student should not naïvely assume that any examiner can remain unaffected by these in coming to an impression of a student's worth.

GENERAL PATTERN OF THESIS

5. There is a generally accepted pattern for theses which present the results of investigation. It is a logical pattern, and one which fits most research reports. It is given here for that reason, but particular theses may demand a different pattern: it should, therefore, be adjusted to the student's own needs if he is convinced that alteration is necessary for greater effectiveness. This latitude does not extend to the first stage set out below: that must be regarded as essential for all theses of this type.

a. Outline of the research.
b. Statement of the problem.
c. Review of the pertinent literature.
d. Design of the experiment.
e. Description of the measurement techniques.
f. Statement of the results.
g. Interpretation and discussion of results.
h. Summary of the conclusions reached.
i. Bibliography and any necessary appendices.

Each of these headings will now be considered in more detail.

OUTLINE OF THE RESEARCH

6. This should need one or two pages only. The purpose of this summary is to enable the reader to take in the whole pattern of the research at a glance, and to provide a frame of reference for him while he is reading the main part of the thesis. It is something more than a table of contents (which, of course, should precede it) but should not contain arguments or discussion. Provided the main aim of the summary is kept in mind the student should have little difficulty in writing this section adequately. No detail should be included unless it contributes essentially to the broad 'frame of reference'. It is usually necessary to write this section last of all. The summary should give, in about 500 words or so, a clear picture of the *aims*, the *methods* and the *results* of the research.

STATEMENT OF THE PROBLEM

7. This must be stated plainly and unequivocally. Some discussion may be opportune, but the temptation to embark on an essay on comparative education or educational psychology must be resisted. The main points the student often feels he would like to make here may be better placed in the next section. It will sometimes be found difficult to state the problem concisely : if this is so the student should ask himself whether this arises from his own lack of clear perception of the problem. He should feel bound to apply himself to a rigorous analysis of his first draft statement until he achieves a concise statement stripped of all but essentials.

REVIEW OF THE PERTINENT LITERATURE

8. The operative word here is ' pertinent '. There is a temptation for a student to drag in a description of books or articles merely because he wishes to show that he has read them. Perhaps he feels that he should be rewarded for such reading, and that the examiner will be impressed by a lengthy description of a large number of works, even though many of them have but a tenuous connection with the problem under investigation. This point of view is erroneous. The examiner is prepared to be impressed by evidence of *critical* reading, and the ability to recognize the relevance or otherwise of particular publications.

9. There is no need to discuss books which describe well-known and well-tried techniques of measurement or research. For example, we might take the thesis which devoted half a dozen pages to a discussion of the opinions of various authorities on the value of intelligence tests in schools. Since the thesis was on a problem of backwardness this section was completely unnecessary : had the problem been one of investigating the rate at which new techniques come to be accepted by teachers and administrators it might have been more pertinent (if it were suitably re-orientated). The examiner is prepared to take for granted the student's knowledge of common and accepted techniques and concepts. To describe or discuss such things is to run the risk of being judged technically naïve.

10. On the other hand, some techniques are new and relatively untried—a review of the development of these, together with an appreciation of relevant results, is often appropriate. So too is a description of researches on problems similar to the one the student is investigating, and on problems which have some bearing on the techniques used by the student or the conclusions reached by him.

11. The review of pertinent literature should not be allowed to spread itself too much. Bald statements of the results obtained, together with any necessary analysis of differences and similarities in the results of different investigators, are all that is usually needed. Fuller accounts of particular aspects of previous work can often best be inserted in one or other of the three following sections. In general, a useful guide for deciding whether a particular work is pertinent for inclusion in this section is the question, will it be necessary for the student to refer to it in describing his own experimental design or measurement techniques, or in discussing his results? One cannot apply this criterion rigidly, but it is a useful guide when in doubt.

DESCRIPTION OF THE DESIGN OF THE EXPERIMENT

12. With this section starts the description of the research proper, and the student will be anxious to make the most of his work by producing a careful and accurate account. The general remarks in paragraphs 2 and 4 are most relevant at this point, paragraph 4.2 in particular.

13. A description of the experimental design should naturally include a brief statement of the method of statistical analysis employed, since one depends upon the other. It should also include an account of the sampling and control devices used, with a clear statement of the *degree of generalization permissible* from the experimental results. This is most important and demands great care and precision in its formulation. The student should not hesitate to point out flaws or weaknesses in the experimental design, indicating the reasons for them. It is rarely possible in educational and sociological research to employ experimental designs which are 'perfect' from the statistician's point of view. For example, complete randomization can hardly ever be achieved. Examiners are aware of this and will appreciate a frank statement of the difficulties encountered together with a description of the methods employed to overcome those which were capable of resolution.

DESCRIPTION OF THE MEASUREMENT TECHNIQUES

14. It is necessary to provide detailed descriptions of all techniques used, with the exception of any tests or measurement devices which are well known and generally available (see paragraph 9). Any modifications of such well-accepted techniques (either in form or administration) must, however, be adequately described.

15. When tests, questionnaires, rating-scales, etc., have been devised especially for the research, it is usually *not* desirable to insert copies of these in the body of the thesis. It is better to include specimen questions in the 'running' account, and place the complete test or questionnaire as an appendix. The aim throughout the thesis should be to facilitate fluency of reading, and to avoid, as far as possible, anything which holds up the development of the subject.

16. Sometimes the actual test material cannot be included as an appendix to the thesis, since it consists of bulky apparatus, etc. In such cases photographs or drawings should be made in order that the reader may have a clear idea of the material used.

17. In describing more subjective methods of measurement (such as teachers' estimates, assessment of behaviour after observation, impressions of qualities of character and temperament) it is necessary to describe how the raters were chosen, what instructions they were given, whether any special techniques were used (e.g. time-sampling), and how the final assessments were treated, for incorporation in the data.

18. In the great majority of theses it is more convenient to include in this section statements about the observed *reliabilities* of the measuring instruments, but occasionally it may be desirable to deal with these in the next section. It is essential to include these data somewhere, and to make sure that they are complete and include all the necessary details of method and analysis.

STATEMENT OF RESULTS

19. In many ways this is the most difficult of all sections to write. Results may be derived from bulky and complex data, and yet they must be presented clearly and succinctly. A large amount of data may be placed as an appendix (in the same way that test material is taken out of the main account). The important questions are: how much should stay in the main body of the thesis, and how much of what remains should be placed in the appendix? It is rarely necessary for the whole of the collected data to be included in the total thesis. For example, it is usually unnecessary to place in the appendix all the item count sheets used in the item analysis of a test—one sheet only would serve as an example. The cardinal principle is to include all data which are necessary to *enable a reader to re-work the statistical analysis* on which the results are based. (This should not be interpreted as conflicting with the previous sentence—a thesis on the production and validation of a new test *would* include item-analysis data, since they are essential to the primary or central subject of the thesis.) Such data should be presented in the most effective form for use, normally a tabular form.

20. It would be confusing to the reader if the whole of the detailed results were included in the text. What is needed here is an effective presentation of condensed or summarized data. Great care must be taken that the process of compression or selection does not result in a biased presentation. An obvious example of the difference between 'appendix' data and 'text' data is the treatment of the test scores of, say, 200 children. The appendix would contain the whole of the raw data—names of children or other identifying data and raw scores of each: the text would contain the same data presented in the form of a frequency distribution, with mean and sigma quoted, and correlations (if necessary) with other measures.

21. The 'text' results must be presented in a form which is meaningful and easily grasped. It follows that as much *graphical* presentation should be employed as possible: diagrams are much more effective than tables in allowing comparisons to be made. (Many books of statistics include sections on graphic presentation, e.g. Kelley, 1947; and examples in Davies, 1946.) It is desirable to give the same data in a table to accompany the diagram so that the reader may judge the adequacy of the graphic analysis. This is also necessary because most data need compression for effective use in diagrams (cf. the number of class-intervals necessary for statistical analysis of a distribution and the smaller number needed for graphical purposes) and the table should show the data both in normal and 'compressed' form.

22. Diagrams and graphs often give trouble to the student owing to the fact that he must prepare more than one copy of the thesis. An effective way of ensuring the accuracy of the copies is to draw out the master copy with care (using appropriate graph paper or squared paper as an aid to accuracy) and to duplicate this by pricking through on to two or three plain sheets of paper. If pricks are registered on the salient points of diagrams, the plotted points on graphs and the unit distances on ordinates and abscissae, the faint marks of the pin pricks on the under-sheets may be joined by appropriate ink lines to produce identical copies of the figures. The value of coloured inks in aiding comprehension should be remembered. The basic ink used should, of course, be waterproof black.

23. Tables should be as simple as possible, and clearly presented so that the reader may easily grasp the meaning of the entries. Column titles should not be over-compressed at the expense of clarity. It is usually not necessary to quote the tabular data in detail in the text, which should rather deal with the interpretations or conclusions leading from the table. The following principles are important to the design of tables:

- 23.1. Tables should be *numbered*, and noted in the 'Table of Contents' at the beginning of the thesis.
- 23.2. The *title* of each table should be brief and yet adequate. (Criterion: can it be read without reference to the text?)
- 23.3. If the table is very wide, it is better to insert it as a folded sheet in the thesis. Readers become annoyed if they have to turn the manuscript sideways.

24. *Calculations* must be accurate. The student should take for granted that the examiner will re-work at least some of his computations. A deplorably low level of accuracy is often found, sometimes in theses which are otherwise excellent. While it is true that a high standard of carefulness is essential throughout all computations, there are two additional ways in which to guard against error. First, all calculations should be *checked*, preferably by a method different from the original (e.g. logs *v*. slide-rule). Frequently positive running checks may be incorporated in a heavy calculation (e.g. the 'check sum' column in multiple correlation). When particular operations are being performed on individual entries in a column of figures, a check may be given by summing the column and performing the same operation on the total. The result should agree with the sum of the transformed column (e.g. the sum of the differences of two columns equals the difference of their sums).

INTERPRETATION AND DISCUSSION OF RESULTS

25. This section should be drafted very carefully indeed. It could effectively start with a re-statement of the problem, and then proceed to a discussion of the results in the light of previous research and psychological theory. In this section threads will be gathered together from all preceding sections of the thesis, and considerable skill is necessary in order to do this and at the same time arrive at a correct emphasis of the factors involved. Here, more than anywhere else, the analysis made in paragraphs 4.1 to 4.7 of some kinds of careless writing could be of value. Of all sections, this is the most difficult in which to effect conciseness and avoid long-windedness. But even at the cost of writing and re-writing, amending and polishing, brevity must be aimed at as the way to achieve lucidity. At the same time, all essential facts, comparisons and discussions must be included : conciseness should be gained by economy not in *what* is said but in *how* it is said. When the section is completed the writer should ask himself how it would read to one who read Sections *a* and *b* (see paragraph 5) and skipped immediately to this section ; the major part should be quite comprehensible to such a reader.

SUMMARY OF CONCLUSIONS

26. These should be listed under serial numbers, and consist of the main conclusions (already discussed in the previous section) framed in the simplest and briefest fashion. Take care that they are accurate; e.g. that they do no violence to the statements made on sampling and range of possible generalizations described in Section *c* (see paragraph 5).

BIBLIOGRAPHY

27. This should follow the summary, and *not* be placed after the appendix. To facilitate easy reference by the reader, it is advantageous to 'tab' the page on which it appears. It is often best to list the bibliography in two parts: those works referred to, or cited in, the text of the thesis, and those having a bearing on the thesis subject, but not specifically mentioned. Each part should be treated in the same detailed way as is described below.

28. The general level of bibliographies in theses and research reports is low. This is a curious fact, since well-established rules and customs exist, and call for little extra effort on the part of the writer. The worst fault the writer can commit (apart from the almost inconceivable one of listing books he has never read !) is to give a reference which is incorrect. It is easy to do this by carelessness: e.g. the 'Journal of Educational Psychology' means something very different from the 'British Journal of educational Psychology'.

29. There are two recognized methods of preparing bibliographies. One method provides a reference number to each book or article. In the body of the thesis reference is made to this number, e.g. (9), or, if a page reference is required, (9, p. 126). The alternative method (the 'Harvard Method') lists the works in alphabetical order of author's name, and reference is made to the name of the author and the year of publication, e.g. (Burt, 1949). Either method may be used, unless the examining body for whom the thesis is intended issues instructions on the point. The Harvard Method is probably the better one for most purposes, since it is more informative to the reader. The name of an author and the year of publication are often enough for the expert reader to identify the book or article without turning to the full bibliography.

30. A 'Harvard' bibliography must be arranged in alphabetical order of authors' names. If more than one article appears under a particular author's name, the articles should be arranged in time-order of appearance. If more than one article for that author appears for the same year, suffixes 'a', 'b', etc., should be added to the year. References to joint articles are listed in the order indicated by the first (i.e. the senior) author's name. Reference to a chapter or section by an author in a book which is edited by another writer is most conveniently made under the author's name, and the editor's name included in the full reference description. Anonymous articles are entered under the name of the institution sponsoring or issuing the publication, e.g. (Royal Society, 1950).

31. Examples of different kinds of entries are given below. Note particularly the order of date, volume and page references when dealing with articles in journals; city of origin preceding publisher with books (also 'edition' if it is not the first). The officially approved abbreviations for journal titles are given in (American Psychological Assn. 1941). The abbreviations for journals most commonly used are given as an appendix to this pamphlet.

Burt, C., 1939a, 'The relations of educational abilities.' Brit. J. educ. Psychol., **9**, 55–71.

Burt, C., 1939b, 'The factorial analysis of emotional traits.' Character & Pers., **7**, 238–254, 285–299.

Burt, C. and Lewis, R. B., 1946, 'Teaching backward readers.' Brit. J. educ. Psychol., 1946, **16**, 116–132.

Flugel, J. C. 1931, 'Theories of psycho-analysis.' In 'An outline of Modern Knowledge.' (chap. 9), London, Gollancz, pp, xv + 1103.

Miller, E. (edit.) 1940. 'The neuroses in war.' London, Macmillan, pp. xii + 250.

National Research Council, Committee of, 1943 'Psychology for the fighting men.' Washington D.C. and N. York, Penguin Books.

32. References in the text of the thesis to books or articles should be made by giving the author's name and the year in brackets, as is done in this memorandum. Quotations (which *must* be accurate) should also be identified in the same way, with the addition of a page reference. For example (extract from thesis):

Burt and Lewis (1946, p. 122, footnote) point out '. . . in psycho-physical work McDougall's favourite method of serial group has itself evoked criticism . . . Here we have yet another instance of the way the psychologist has often anticipated the principles recently worked out by statisticians for agricultural research.'

33. Normally only those books or articles which have been read by the student appear in the bibliography, but occasionally it is necessary to include others. These should be clearly marked to differentiate them (e.g. by an asterisk and an appropriate footnote). An excellent example of a bibliography treated like this will be found in Eysenck (1947), which also shows how items in a long list of articles may be annotated in order to help the reader to pick out particular kinds of references.

34. The common mistakes of incorrect order of bibliography entries and (more serious) incorrect references in the text, can be avoided by a sensible work-method when writing the thesis. References should be written out on slips of paper (one to each slip) in the order in which they are referred to in the text, and lettered A, B, C, etc., in that order. Text references to these letters are inserted in pencil. When the thesis is completed the slips are sorted into correct order for the bibliography and the pencilled letter-references confirmed in their final form.

APPENDIX

35. If the appendix is bulky, or contains more than two or three sections, it is advisable to number the pages in roman style and insert a table of contents at the beginning. The remarks in paragraph 19 on what is to be included should be referred to.

TYPING

36. Two copies of the thesis have usually to be presented by the student : obviously he must have *three* copies made. It is not generally appreciated that even theses which are not 'accepted' in the examination sense of the term remain the property of the University, and are not necessarily returnable to the student.

37. The question of 'foolscap' or 'quarto' is one which must be settled by reference to the data which have to be included—*quarto* is preferable on most counts, but it is often difficult to compress certain tables or diagrams within this compass, in which case foolscap should be used. Typing *must* be double spaced (with the exception of footnotes and long quotations). It may be of some help to students to give the following information about words per page :

37.1. Double-spaced quarto with inch margins (approximately $6\frac{1}{2}$-inch line) :
  Pica type (the usual type) . . 275 words per page
  Elite type (smaller) . . 330 ,, ,, ,,

37.2. Double-spaced foolscap with inch margins (approximately $6\frac{1}{2}$-inch line) :
  Pica type . . . . 350 words per page
  Elite type . . . . 425 ,, ,, ,,

37.3. Printed journals :
  450–600 words per page
  Bibliography 22–28 entries per page
  (Anderson & Valentine, 1944).

Binding of Thesis

38. The complete thesis must be contained within a stout binder or cover. It is obviously desirable to present the thesis in a form which enables the examiners to read it without difficulty. The binder used must therefore hold the sheets securely and at the same time allow the whole of the text of each page to be visible without removing the leaves. With certain kinds of spring-back binders it is necessary to allow a two-inch page margin to achieve this in the middle of a fairly bulky thesis. Some University departments require theses to be properly bound. Students should consult local regulations for the type of binding expected. Usually one or two firms in the district specialize in this work.

II

THE PREPARATION OF A PAPER FOR PUBLICATION

39. This is a very different task from preparing a thesis. One of the main differences is in bulk : a thesis re-written for publication in an appropriate journal would normally be reduced to 20 per cent or 25 per cent of its original length. The writer must be aware of the different requirements of the *examiner* on the one hand, and the journal *reader* on the other. The examiner is primarily interested in the student and in his capacities as revealed in the thesis ; the reader is interested (if at all) in the research and its conclusions. The realization of this difference will help the writer to avoid including unnecessary material.

PRELIMINARY PLANNING

40. It is advisable to know beforehand which particular journal is aimed at, since journals differ in format and lay-out. Some journals (or groups of journals) lay down precise rules for the guidance of contributors (cf. Anderson & Valentine, 1944). In other cases, it is necessary for the writer to study the journal in question, and to note such things as the type of bibliography used, whether a summary is required, the accepted layout of tables, etc.

41. The same general plan may be used as for a thesis (para. 5)—subject to the considerations mentioned in paragraph 40—although some headings may profitably be combined for a particular article (e.g. *b* and *c*, *d* and *e*). Each section will be much shorter than the corresponding section for a thesis : for example, in reviewing the pertinent literature only those works which are immediately and directly relevant to the research should be cited. Discussion or description of new techniques is rarely necessary : a bare reference is enough.

TYPESCRIPT

42. The paper should be typed double-space, preferably on quarto paper. Great care should be taken with mathematical symbols and formulae (Royal Society, 1950, pp. 4 and 19); margins of 1½ inches or 2 inches should be left in order to give ample room for editorial corrections and instructions to the printer. Headings and subheadings should follow the normal practice of the journal concerned, and it is better to have too many than too few, since it is easier for the editor to delete than to create. When dealing with semi-tabulated matter within the text, a consistent scheme should be adopted for numbering or lettering the sub-paragraphs. It is surprising what lack of consistency is often shown here. It is clear that, in general, we have a choice of arabic numerals, roman numerals (capitals and lower-case), capital letters and lower-case letters. It is rarely necessary to have more than three subdivisions, so that a reasonable scheme would be :

(1) Arabic numeral for main sub-paragraph
    (*b*) Lower-case letter for further subdivision.
        (i) Lower-case roman for final subdivision.

The use of brackets in this connection is not usually obligatory.

43. It is necessary to know the printers' conventions for indicating differences in type form. Anything with a single underlining will appear in *italics*, with a double underlining will appear in SMALL CAPITALS, with a triple underlining will appear in CAPITALS and with a wavy underlining will appear in **bold face** (either in **CAPITALS** or **lower-case**). Headings and subheadings should *not* be so marked : the printer will follow the usual practice of the journal.

44. The use of *footnotes* should be minimized, since they add to the compositor's difficulties and hence to the cost of printing. Some journals ask for footnotes to be collected on separate sheets at the end of the manuscript : failing such an instruction it is best to insert each footnote in the typescript immediately after the line concerned, and to mark it off by horizontal rules :

'Such writers[1] will have difficulty in avoiding the use of colourful and emotionally toned words.'

Some journals give references in footnotes and avoid the use of a bibliography, but this practice is not recommended if the writer has a choice.

TABLES AND DIAGRAMS

45. Advice already given in Part I of this pamphlet (paras. 23, 23.1, 23.2) is relevant to printed papers too. Study of the journal concerned will give information on additional points such as: position of title (above or below); roman or arabic numbering; sides of table closed or open; size of table possible for size of page. With large tables of inter-correlations it is possible to reduce space (and compositor's time) by omitting decimal points and including a note to this effect as a subscript to the table title. It is often useful to number the columns of a table, particularly if column headings cannot be fully explanatory without using too much space, so that amplification in the body of the text becomes necessary.

46. The emphasis on graphical presentation in paragraph 21 cannot be made for printed papers, since diagrams and illustrations are expensive to reproduce. Few journals will allow a diagram for data also given in tabular form. Photographs (half-tone blocks) are more expensive than drawings (line blocks). The use of illustrations must therefore be kept to a minimum: any that *are* used must be effective. This demands care and skill in preparation. Writers who are not proficient draughtsmen are advised to employ an expert to do the work under direction.

47. It is easy for the printer to produce a block which is larger or smaller than the original drawing. Therefore it is advantageous to make the original a larger size than is required in the finished article. This makes the task of drawing easier, and also the process of reduction tends to improve the drawing by making slight irregularities or imperfections less perceptible. It is convenient to make the drawing twice the size of the required printed figure.

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[1] Preliminary analysis of work in progress would suggest that this is a function of personality.

48. If graph-paper forms the drawing surface, only faint blue-lined paper should be used: other types demand an extra process during printing to take out the lines. The 'pricking' technique described in paragraph 22 may avoid any difficulty here if it is used to transfer the graph to smooth Bristol board before drawing in Indian ink. Letters and numbers on the diagram should be left *in pencil* so that type may be substituted by the printer. Shading or hatching too may be left to the printer, and appropriate instructions given in pencil in the margin. Good margins of 2 inches should be left on all sides of tables and diagrams. The approximate desired positions of diagrams should be indicated in the typescript. Much additional information on the preparation of illustrations may be found in (Royal Society, 1950, pp. 10–15).

CORRECTION OF PROOFS

49. There are two types of proof supplied to authors: page-proofs and galley-proofs. In the latter the typescript is reproduced on long 'galleys' preparatory to the break-down into pages. Proofs are provided so that authors may check the accuracy of the printing. This opportunity of correcting printers' errors is essential, but it should *not* be used as an opportunity for revising the writer's own original composition. Errors of fact which have previously gone undetected must, of course, be corrected—but with adequate care in the original drafting such errors should not be present. With galley-proofs a line or two may usually be added without much difficulty: with page-proofs this is not possible without a great deal of labour and expense (which may be charged to the author!).

50. Proof-reading is not easy. Few persons are really good at it: this may, perhaps, be because it *appears* simple. Our normal reading habit is to apprehend whole words, or phrases, as units: for successful proof-reading it is necessary to make a continuous conscious effort to analyse our perceptions. Speed of reading must be reduced to achieve this. Proof-reading of numerical data is particularly difficult, and can best be done by enlisting the help of a colleague to read the manuscript aloud as the proof is followed.

51. The symbols used in the margin to indicate errors and corrections are a source of difficulty to the novice. The recognized marks are laid down in British Standard 1219 (1945); examples are also given in Royal Society (1950), (Cambridge Univ. Press, 1951) and in most recent issues of *Whitaker's Almanack*. The unpractised proof-reader should not, however, permit himself to be over-awed by the apparent complexity of the system of signs and symbols: when in doubt about a notation, he should write a marginal note to the printer explaining in simple English what is required.

OFFPRINTS

52. Most scientific journals allow the author a stipulated number of offprints of his article free of charge. If additional copies are required, these will be supplied at appropriate charges. Usually it is necessary to order such extra copies at the time the proofs are returned. Scientific journals do *not* pay for contributions. Students should, perhaps, be warned that many U.S. journals of education and psychology require the author to pay for publication. If many diagrams are included, the charge may be considerable. Some journals offer immediate publication if a higher fee is paid by the author.

TYPOGRAPHY

53. The author has no control over the typography employed by journals, but in the case of pamphlets and—particularly—tests he may usefully exercise some judgement on this point. The standard of typography used in printed tests in this country is deplorable. This is surprising, since the *aesthetic* value of good typography should always be taken into consideration, and all the more so when it is inextricably bound up with *function*. Almost all printed mental tests depend for their efficiency upon the ease with which the subject can interpret the printed symbols on the page. The effectiveness of instructions, for example, can be greatly improved by suitable typography, so that they are easily distinguishable from the actual items of the test. It is unnecessary to adopt the extremist position of the '30's and completely identify aesthetic value with 'fitness for purpose' in order to agree that good typography will enhance the functional value of the finished test. An excellent introduction to the basic principles of typography is provided by Morison (1951). A study of this, and other related books, will prevent authors from allowing the grosser errors to be made, the commonest of which (with mental tests) is, perhaps, the mixture of types from quite different founts on the same page.

BIBLIOGRAPHY

American Psychological Assn., 1941. *Key to Periodical Abbreviations.* Psychol. Abstr., **15**, 641–649.

Anderson, J. E., & Valentine, W. L., 1944. *Preparation of articles for publication in the Journals of the American Psychological Association.* Psychol. Bull., **41**, 345–376.

British Association, 1935, *Biological Measurements.* British Association, Burlington House, London, W.1.

British Standard 1219, 1945. *Printers' and Authors' Proof Corrections.* London. British Standards Institution.

Cambridge University Press, 1951. *Preparation of Manuscripts & Correction of Proofs.* London. Cambridge Univ. Press. pp. 19.

Davies, N. M., 1946. *Human Relations in Industry.* London. Nicholson & Watson. pp. 127.

Eysenck, H. J., 1947. *Student Selection by means of Psychological Tests—a Critical Survey.* Brit. J. educ. Psychol., **17**, 20–39.

Fowler, H. W., 1926. *Modern English Usage.* Oxford, Oxford Univ. Press. pp. viii + 742.

Fowler, H. W., & Fowler, F. G., 1931. *The King's English.* Oxford, Oxford Univ. Press. Third edition. pp. 383.

Gower, Ernest, 1948. *Plain Words.* London, H.M. Stationery Office. pp. 94.

Hart, H., 1950. *Rules for Compositors & Readers at the University Press, Oxford.* 35th edition. London, Cumberlege. pp. 143.

Jepson, R. W., 1936. *Clear Thinking.* London. Longmans Green. pp. xiii + 179.

Kelley, T. L., 1947. *Fundamental of Statistics.* Cambridge, Mass., Harvard Univ. Press. pp. xvi + 755.

London Mathematical Society, 1932. *Notes on the Preparation of Scientific Papers.* London. C. F. Hodgson Ltd., 23 Pakenham Street, W.C.1.

Morison, Stanley, 1951. *First Principles of Typography.* London. Cambridge Univ. Press. pp. 18.

Ogden, C. K. & Richards, I. A., 1944. *The Meaning of Meaning.* London. Kegan Paul. Sixth edition. pp. xxii + 363.

Royal Society, 1950. *General Notes on the Preparation of Scientific Papers.* London. Cambridge Univ. Press. pp. 26.

Thouless, R. H., 1930. *Straight & Crooked Thinking.* London. Hodder & Stoughton. pp. vii + 284.

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APPENDIX

Some of the Commoner Journals in the Field—their Correct Abbreviations

Amer. J. Psychol.
Brit. J. educ. Psychol.
Brit. J. Psychol.
Brit. J. Psychol. Monogr. Suppl.
Character & Pers.
J. abnorm. soc. Psychol.
J. appl. Psychol.
J. educ. Res.
J. exp. Educ.
J. exp. Psychol.
J. gen. Psychol.
J. genet. Psychol.
J. Psychol.
J. soc. Psychol.
Nature, Lond.
Occup. Psychol.
Psychol. Abstr.
Psychol. Bull.
Psychol. Monogr.
Psychol. Rev.
Psychometrika
Rev. Pedag.
Sch. Rev.
Sch. & Soc.
Teach. Coll. Contr. Educ.
Teach. Coll. Rec.
Univ. Ia. Stud. Educ.
Univ. Ia. Stud. Psychol.

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